

WHAT IS CLAIMED IS:

1. A method for identifying peptides which can bind to an inorganic material using a combinatorial phage display library comprising:
 - 5 a. incubating a combinatorial phage peptide display library with a target inorganic material which will bind to peptides expressed by the phage of the library;
 - b. eluting the library so as to collect the phage bound to the target inorganic material;
 - 10 c. isolating the nucleic acid of the phage bound to the target inorganic material; and
 - d. sequencing said nucleic acid so as to determine the sequence of the peptides coded by the nucleic acid of the phage which can bind to the target inorganic material.
- 15 2. The method of claim 1 further comprising a step of expressing the peptide identified by steps a-d.
3. The method of claim 1 wherein steps a-b are repeated so as to increase the purification of the phage bound to the inorganic material.
- 20 4. The method of claim 1 wherein the peptide expressed by the phage is capable of catalyzing the deposition or precipitation, or controlling or directing the growth of the target inorganic material.
- 25 5. The method of claim 1 wherein the inorganic material is selected from the group consisting of silica, silver, germanium, cobalt, iron, and oxides thereof.
- 30 6. The method of claim 1 wherein the inorganic material is selected from the group consisting of aluminum, antimony, beryllium, cadmium, copper, gold, iron, lead, selenium, palladium, platinum, and zinc, and oxides thereof.

7. The method of claim 1 wherein the inorganic material is a radioactive material.

8. The method of claim 7 wherein the radioactive material is selected from the group consisting of radioactive cobalt and uranium.

9. A peptide identified by the method of Claim 1.

10. A peptide according to Claim 9 wherein said peptide binds to a material selected from the group consisting of silica, silver, germanium, cobalt, iron, and oxides thereof.

11. A peptide according to claim 9 wherein the inorganic material bound by the peptide is selected from the group consisting of aluminum, antimony, beryllium, cadmium, copper, gold, iron, lead, nickel, selenium, palladium, platinum, and zinc, and oxides thereof.

12. A peptide according to claim 9 wherein the inorganic material bound by the peptide is a radioactive material.

13. The method of claim 12 wherein the radioactive material is selected from the group consisting of radioactive cobalt and uranium.

14. A peptide according to Claim 9 wherein said peptide binds to silica, and wherein the sequence of said peptide is selected from the group consisting of SEQ ID NOS: 1-8.

15. A peptide according to Claim 9 wherein said peptide binds to silver, and wherein the sequence of said peptide is selected from the group consisting of SEQ ID NOS: 10-12.

16. A peptide according to Claim 9 wherein said peptide binds to germanium, and wherein the sequence of said peptide is SEQ ID NO: 9.

5 17. A peptide according to Claim 9 wherein said peptide binds to cobalt oxide, and wherein the sequence of said peptide is selected from the group consisting of SEQ ID NOS 13-39.

10 18. A peptide according to Claim 9 wherein said peptide binds to iron oxide, and wherein the sequence of said peptide is selected from the group consisting of SEQ ID NOS 40-55.

15 19. A method for obtaining phage which can express a peptide which can bind to an inorganic material using a combinatorial phage display library comprising:
 a. incubating a combinatorial phage display peptide library with a target inorganic material which will bind to peptides expressed by the phage of the library; and
 b. eluting the library so as to collect the phage bound to the target inorganic material.

20 20. A method of initiating the deposition or precipitation of an inorganic material on a nanometric scale comprising expressing a peptide obtained by the method of claim 1, and using said peptide as a template to initiate the deposition or precipitation of said inorganic material.

25 21. The method according to Claim 20 wherein said inorganic material is selected from the group consisting of silica, silver, germanium, cobalt, iron, and oxides thereof.

30 22. A nucleic acid encoding a peptide according to Claim 9.

23. A nucleic acid according to Claim 16 wherein the nucleic acid encodes a peptide having a sequence selected from the group consisting of SEQ ID NOS: 1-55.

24. A method for recovering an inorganic material using a peptide according to Claim 9 comprising:

a. providing the peptide of claim 1 in an amount effective to reduce or eliminate the inorganic ingredient to which said peptide will bind;

b. introducing said peptide into a solution containing the inorganic material to be removed and maintaining the peptide in said solution for a time sufficient for the peptide to bind with said inorganic material; and

c. removing said peptide after it has become bound to said inorganic material so as to recover the inorganic material.

25. A method according to Claim 24 wherein said inorganic material is a radioactive material.

26. A method for delivering an inorganic material using a peptide according to Claim 9 comprising:

a. providing the peptide of claim 1 in an amount effective to bind to the inorganic ingredient to which said peptide will bind;

b. linking said bound peptide with a molecule that can target a site to where said inorganic material is to be delivered; and

c. introducing said peptide so that it will reach the site to where it is directed.

27. A method according to Claim 26 wherein said inorganic material is a radioactive material.

28. A method according to Claim 26 wherein said delivery of said inorganic material is to a human or animal patient.

29. A method according to Claim 26 wherein said peptide is linked to an antibody capable of targeting a particular tumor cell so as to direct the inorganic material bound to said peptide to a tumor site.

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30. A cartridge for filtering or recovering an inorganic material comprising the peptide according to Claim 9 and a suitable support.

10 31. The cartridge according to Claim 30 wherein said solid support is a resin or a polysaccharide.

32. A method for identifying peptides which can bind to a stable inorganic element or a stable inorganic complex of said element using a combinatorial phage display library comprising:

15 a. incubating a combinatorial phage display peptide library with a target inorganic element or complex which will bind to peptides expressed by the phage of the library;

b. eluting the library so as to collect the phage bound to the target inorganic element or complex;

20 c. isolating the nucleic acid of the phage bound to the target inorganic element or complex; and

d. sequencing said nucleic acid so as to determine the sequence of the peptides coded by the nucleic acid of the phage which can bind to the target inorganic element or complex.

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